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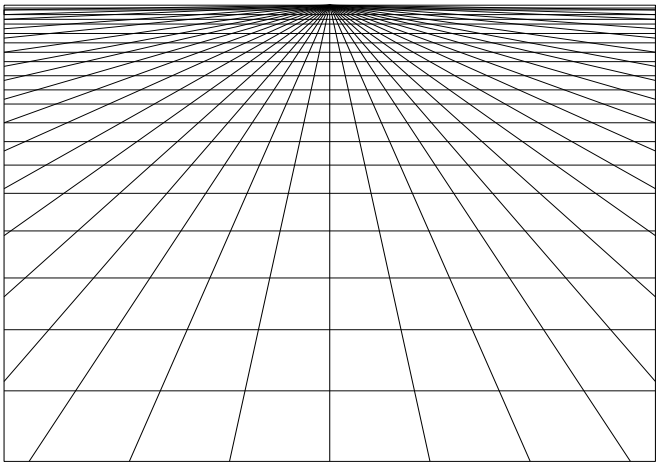

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Expertise and the Framing of Science-Oriented Disputes

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Abstract

I present two linked arguments related to the ongoing discussion in the field of Science and Technology Studies (STS) concerning how expertises should be classified in connection with science-related disputes. My first argument is that the ongoing and much debated efforts of STS scholars Harry Collins and Robert Evans to create a normative theory of scientific expertises ignore important insights from STS into the relationship between scientists and publics. I demonstrate that the goal of new demarcation criteria between experts and non-experts is currently being pursued without a sufficient consideration for the contrasting frameworks through which publics and scientific communities conceive of science-related disputes, and, as a consequence, that the normative theory of expertise, in its proposed form, risks unduly favouring representatives of science over those of public participants. My second argument is that, from the point of view of STS scholarship, an analytical approach focusing on the processes by which research questions are formulated, or *framed*, is promising in terms of understanding the basis for public involvement and stance taking in science-related disputes. While the normative classification of expertises is useful for examining the legitimacy by which individuals are involved in science-related issues, I demonstrate that the analysis of framing-processes can be used to examine the formulation of issues, thereby forming a useful and necessary supplement to Collins and Evans' proposed theory. I suggest that better understandings of the relationship between scientific experts and laypersons in the context of science-related disputes might be achieved by analysing the ability of either group to influence the framing of relevant issues in the public sphere.

Keywords: *civic epistemology, expertise, framing, decision making, public participation*

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Abbreviations

AIP	Asian and Pacific Islander communities (State of Washington, U.S.)
BTNAS	Bioaccumulative Toxics in Native American Shellfish
CEEH	Center for Ecogenetics and Environmental Health (Under NIEHS)
CSSS	Cardiff School of Social Sciences (Cardiff University, Wales)
EPA	Environmental Protection Agency (U.S.)
ICSC	Indochinese Cultural and Service Center (State of Washington, U.S.)
KWA	Korean Women's Association (State of Washington, U.S.)
MRFFG	Marine Resources for Future Generations
NIEHS	National Institute of Environmental Health Sciences (U.S.)
SEE	Studies of Expertise and Experience
STS	Science and Technology Studies
U.S.	The United States of America
WSDE	Washington State Department of Ecology (U.S.)

No man can reveal to you aught but that which already lies half asleep
in the dawning of your knowledge.

The teacher who walks in the shadow of the temple,
among his followers, gives not of his wisdom
but rather of his faith and his lovingness.

If he is indeed wise he does not bid you enter the house of his wisdom,
but rather leads you to the threshold of your own mind.

The astronomer may speak to you of his understanding of space,
but he cannot give you his understanding.

The musician may sing to you of the rhythm which is in all space,
but he cannot give you the ear which arrests the rhythm
nor the voice that echoes it.

And he who is versed in the science of numbers
can tell of the regions of weight and measure,
but he cannot conduct you thither.

For the vision of one man lends not its wings to another man.

And even as each one of you stands alone in God's knowledge,
so must each one of you be alone in his knowledge of God
and in his understanding of the earth.

Kahlil Gibran

1: Introduction

This paper presents two linked arguments related to the ongoing discussion in the field of Science and Technology Studies (STS) concerning how expertises should be classified in connection with science-related disputes. The first argument is that the ongoing and much debated efforts of STS scholars Harry Collins and Robert Evans to create a normative classification of scientific expertises ignore important insights from STS into the relationship between scientists and publics. I will demonstrate that their goal of new demarcation criteria between experts and non-experts is currently being pursued without a sufficient understanding of the contrasting frameworks through which publics and scientific communities conceive of science-related disputes, and, as a consequence, that the normative theory of expertise, as proposed by Collins and Evans, risks unduly favouring representatives of science over those of public participants. The second argument is that, from the point of view of STS scholarship, an analytical approach focusing on the processes by which research questions are formulated, or *framed*, is promising in terms of understanding the basis for public involvement and stance taking in science-related disputes. While the normative classification of expertises is useful for examining the legitimacy by which individuals are involved in science-related issues, I will demonstrate that the analysis of framing processes can be used to examine the formulation of issues, thereby complementing Collins and Evans' proposed theory on critical points. This paper suggest that better understandings of the relationship between scientific experts and laypersons in the context of science-related disputes might be achieved by analysing the ability of either group to influence the framing of relevant issues in the public sphere.

As this paper is written as a discussion article, its methodology is largely restricted to literature review. I rely primarily on STS literature to investigate the relationships between

experts and publics, using discussion articles from the journal *Social Studies of Science* to discuss the debate about Collins and Evans' theory of expertises. For literature on framing I draw on research from several fields, most notably Cognitive Linguistics, Political Science and Sociology. I also present two case studies from the area of Environmental Health (Judd et al., 2005) in Chapter 4 to illustrate my argument for the employment of framing-oriented perspectives as a supplement to Collins and Evans' normative theory of expertises.

This introductory chapter gives a cursory introduction to the STS debate on the classification of expertises. It includes an overview of recently proposed criteria for demarcating experts from non-experts, as well as an overview of the criticisms that will be discussed later in the paper. Brief summaries of each chapter will be given along with a summary of my conclusion, which consists of proposals for increased understanding of the relationships between publics and scientific experts involved in science-oriented disputes.

1.1. Debating Expertise

In a famous allegory from The Republic, Plato recounted Socrates' portrayal of a group of prisoners chained in a cave since early childhood who, constrained so as always to face the back of the cave, grew to describe as true and real the shadows from activity behind them which were projected onto the stone walls by a fire (514a-518b). The philosopher, Socrates[1] argued, was like a slave released from the cave; his clear-sighted ability to identify the underlying reality behind the cave dwellers' silhouette-grounded epistemology provided him not only with the legitimate right to govern his former fellow prisoners, but also (in light of Socrates' notion of the ideal, physically and mentally nurtured ruling, or *guardian* class) with the *decisive duty* to do so (519b-c).

[1] All references to Socrates in this paper refer to Socrates as depicted by Plato, without any commitment to what could have been said by the philosopher Socrates as he really existed.

As far as Socrates was concerned, those who possessed true insight, grounded in philosophy, would be perfectly happy to go about their mental meandering in peace, leaving the task of political governance to those more ambitious for power but philosophically less apt. But as the former group would be better suited to rule, Socrates argued that an ideal political system of governance would *compel* philosophers to lead. And even though the wider populace would, in their ignorance, be more inclined towards preferring the ambitious power seekers as their commanders due to the self-taught ability of this group to mimic the virtues of leadership, they too would have to be compelled to accept philosophers as rulers.

It would be a mistake for us, as STS scholars of the third millennium, to dismiss this excerpt from The Republic as merely an obsolete attempt to impose a philosophical orientation of what we now call scientism. Socrates was in fact attempting to answer questions which today's scholars still struggle with; how heavily should the authority of experts bear upon the processes of governance?, what relationship should exist between the different knowledge systems in society?, on what basis, and for what purpose, can a normative classification of expertises be constructed?[2] He made a salient observation as well; true experts are not likely to be recognised as such by the general public.

The view that the task of classifying experts cannot be entrusted to the general public resonates with the recent turn towards Studies of Expertise and Experience (SEE), which was launched by STS theorists Harry Collins and Robert Evans in 2002. Collins and Evans show less confidence than Socrates about the clear-sightedness of experts, however, arguing that not even skilled practitioners of science are necessarily capable of identifying the relevant types of proficiency in science-related disputes. In their 2002 article, the authors claimed that

[2] Incidentally, The Republic also explores in some depth with another question that is still highly relevant to the field of STS; 'how can true expertise be attained?' However, exploring that point here would elaborate on an already lengthy digression.

the field of STS had grown stuck in a ‘Second Wave’ of scholarship characterised by intense but aimless preoccupation with breaking down the boundaries between scientific expertise and laypersons through focusing its research on the identification of social influence over scientific practice (Collins and Evans, 2002, pp. 235-239). In order to progress and to face the increasingly acute challenges of weighing the opinion of technical experts against groups of stakeholders for political legitimacy, the authors argued that a ‘Third Wave of Science Studies’ was needed – and with it, a normative theory of expertise.

Their paper was met with criticism on several points, but it was also widely recognised that Collins and Evans had addressed important challenges for STS (Jasanoff, 2003, Wynne, 2003, Rip, 2003). Several SEE-oriented papers have since been published (Boyce, 2006, Carolan, 2006, Giles, 2006, Weinel, 2008), and Collins and Evans’ proposals from 2002 was published in book form in 2007. Among the most important contributions to have surfaced from their endeavour so far is the notion of ‘interactional expertise’ (Collins, 2004), a skill connected with the mediation of tacit knowledge, and the ‘Periodic Table of Expertises’ (Collins and Evans, 2007, p. 14), wherein scientific expertises are made comparable to various forms of lay knowledge.

One notable response to Collins and Evans was authored by Brian Wynne, who criticised the pair’s lack of engagement with the way that scientific controversies are framed, or translated into questions of public meaning (2003, p. 402). He argued that the investigation of how ‘civic epistemologies’ (Jasanoff, 2005, pp. 247-271,Wynne, 2003, p. 402) affect disputes that might be mistakenly understood as being science-oriented would be an appropriate alternative to the creation of new demarcation criteria for expertise (Wynne, 2003, p. 402).

This paper presents similar concerns to those raised by Wynne. I will discuss three linked criticisms directed towards Collins and Evans’ lack of attention to the context wherein

science-related issues are formulated into technical questions – a process by which issues are moved from the sphere of public contestation and into the custody of experts. However, my intentions are not to discredit the theory of Collins and Evans, but rather to contribute to their project. I discuss attention to the process of research framing as a supplementary tool rather an alternative one, and will argue that the analysis of framing processes can be used alongside Collins and Evans' approach in order to better address three critical points.

These three criticisms of Collins and Evans are presented in Chapter 2, which is subdivided into two sections. Section 1 introduces the central concepts and approaches of SEE and Collins and Evans' normative theory of expertises, as well as some of the early experimental research that the two scholars have conducted to test their notion of interactional expertise. Section 2 identifies three criticisms of SEE in its current form. The first criticism is based on Sheila Jasanoff (2003), and revolves around the positive arguments for public participation in science-related governance, which Collins and Evans largely ignore in their attempt to distinguish experts from non-experts. It is argued that their normative classification of expertises conflicts with important democratic principles related to citizen participation in governance. I draw on the European Commission's (2002) guidelines for the appointment of expert consultants to illustrate this point. The second criticism deals with Collins and Evans' attempt to provide a culture-specific justification for their normative theory of expertises, which the two authors claim is embedded in specifically 'Western' principles regarding science as an authority on truth judgements. I identify some weaknesses in this clam and suggest that the self imposed cultural boundaries of Collins and Evans' theory might be unnecessarily narrow. The third criticism is based on Wynne (2003), and concerns the neglect of Collins and Evans to address the process by which questions are framed in science related disputes in the public sphere. The chapter concludes by suggesting that a framing-oriented

analytical perspective might be a useful supplementary tool in the application of Collins and Evans' normative theory of expertises.

Chapter 3 gives an introduction to the concept of framing, attributable to Erving Goffman (1974) as a sociological concept used in relation to the contextualisation of information and the organisation of experiences, but also used more generally to signify the strategic formulation of information. I suggest that the concept has some relevance for addressing the problems identified in Chapter 2, arguing that the challenges presented there are all rooted in Collins and Evans' lack of engagement with the ways in which cultural and institutional contexts affect the public perception of science-related disputes. Their neglect is problematic because it contributes to a normative theory of expertises where the formation of public knowledge bases, what Jasanoff and Wynne refer to as 'civic epistemologies,' is not considered on its own terms, but rather subjected to strictly science-oriented perspectives on how problems are identified, formulated and resolved. In order to supplement Collins and Evans' approach to the study of the boundaries between experts and non-experts, I argue in Chapter 3 that framing-oriented perspectives are useful for understanding the interpretation and stance-taking of public groups in science-related disputes, and that they are therefore also useful for addressing the three challenges to SEE presented in Chapter 2. I will discuss possible approaches to the understanding of framing processes in the context of science-related disputes while also discussing some of the challenges associated with their use.

While Chapter 3 provides an introduction to the concept of framing and to the breadth of definitions of this concept given in the literature, Chapter 4 operates with a narrow understanding of the term in order to discuss two case studies from the U.S. State of Washington. The case studies, published by Nancy L. Judd et al. (2005), demonstrate the potential impact that community involvement in framing processes might have on scientific analyses as well as on the dissemination of knowledge in local communities. Describing the

participation of Asian and Pacific Islander communities and the Swinomish Tribe in the process of framing research questions in the risk analysis of seafood contamination levels, both studies demonstrate the benefits of such inclusion for the technical research phase as well as for the building of local awareness and interest in seafood safety. I discuss some limitations of community participation in framing processes, such as the substantial costs associated with facilitating public participation at an early stage of research. I conclude, however, that the involvement of publics in research framing has considerable advantages in terms of facilitating research that is responsive to public concerns, and that heightened attention to the framing process might therefore serve as an important complementary tool for STS researchers working under the analytical perspective of SEE.

1.2. Objectives

In his aforementioned treatise, Plato discussed the notion that there are many different types of expertise in a society. But for him, these systems were limited to the proficiency of the blacksmith versus that of the farmer or of the carpenter. The subordination of these expertises to the authority of philosophy was not to be disputed, as the superiority of logical reasoning was seen as self-evident. Today, knowledge of the complex relationships between science and society means that we can no longer take for granted the authority of experts as representatives of some idea of pure and untainted truth. As STS scholars we must instead seek to understand the ways in which different conceptions of knowledge coexist, using our insights to improve the processes by which experts are involved in decision making and the level of influence which publics are allotted in science-related disputes.

The act of framing science-oriented questions helps determine the manner in which experts are called to pass judgement. Collins and Evans' proposed normative theory of expertises is only concerned with the selection of relevant experts after relevant questions

have been established, and not with how these problems are formulated in the first place. I therefore argue that the assessment of the levels of expertise possessed by individuals has its useful and necessary complement in the analysis of the processes by which science-related issues are framed in the public sphere.

2: Governing Experts: Recent Developments

I will now introduce recent research in STS on the problems associated with weighing the opinions of scientific experts against those of stakeholder groups in science-related governance. This chapter focuses in particular on the strategies suggested by Harry Collins and Robert Evans (2002, 2007) for policymakers and STS researchers, and on the debate which followed their launch of Studies of Expertise and Experience (SEE) in 2002. The exploration in this chapter of criticisms and advantages of SEE forms the basis of my argument for a framing-oriented, supplementary approach, which will be presented in Chapter 3 and Chapter 4.

The chapter is divided into two main sections. Section 1 is dedicated to understanding SEE, both in its proposed, idealised form, and in the form that it is currently practiced at the Cardiff School of Social Sciences (CSSS). I will outline Collins and Evans presentation of SEE based on two key publications, 'The Third Wave of Science Studies: Studies of Expertise and Experience' (2002) and *Rethinking Expertise* (2007). A selection of SEE-oriented papers will also be presented. The section concludes with some reflections on the implications which Collins and Evans' proposed turn might have for future science-related governance. Section 2 gives a very brief presentation of three linked criticisms of Collins and Evans' SEE scholarship and of their normative theory of expertises, drawing primarily on discussion papers from *Social Studies of Science*. The first criticism is directed towards Collins and Evans' lack of engagement with the positive arguments for public involvement in science-related governance; the second criticism is that Collins and Evans' use of 'Western society' as a cultural alibi for the theory of expertises does not provide a sufficiently strong argument for the authority of science on truth judgements; and the third criticism is directed towards their neglect to consider the context wherein science-related issues are defined, or *framed*, and thus

given meaning. The chapter concludes with a short summary and the suggestion that in light of the criticisms discussed, an increased attention to framing processes might form a useful and necessary complementary analytical tool for SEE-oriented research.

2.1. SEE and the Normative Theory of Expertise

Collins and Evans' paper 'The Third Wave of Science Studies: Studies of Expertise and Experience' (2002) is an attempt to move STS into a more proactive position with regards to the problems associated with weighing the opinions of experts in science-related disputes. It is also an attempt to create a normative theory of expertise which accommodates the expertise of accredited scientific experts alongside that of experts whose qualifications cannot be judged by credentials, while at the same time ensuring that non-experts are excluded from the technical aspects of science-related disputes. This STS perspective is presented as having practical application in situations where democratic ideals of stakeholder involvement and public participation conflicts with the authority of scientific experts in technical disputes. Collins and Evans writes that such a turn forms a 'Third Wave of Science Studies' which might run concurrent with the presently dominant 'Second Wave' of scholarship (2002, p. 249). They claim that the second wave (which includes the Sociology of Scientific Knowledge (SSK)) is characterised by a preoccupation with identifying the social influences on scientific activity on one hand, and with 'the need to extend the domain of technical decision-making beyond the technically qualified élite, so as to enhance political legitimacy' – the so called 'Problem of Legitimacy' – on the other (Collins and Evans date the 'First Wave' of Science Studies to the 1950s and 1960s' attempts to understand and improve the conditions for the perceived success of the sciences) (2002, pp. 235-239). In Collins and Evans' view, the problem of legitimacy has been replaced by the 'Problem of Extension,' to which STS scholars have to respond. As such, the proposed turn towards SEE is envisaged as

both a natural continuation of previous STS scholarship, and, as is implied by the step towards a normative theory of expertise, as a more problem-oriented approach to science studies.

The notion that previous STS research can be grouped into two distinct waves is met with strong opposition by critics who see it as a gross misreading of the field (Jasanoff, 2003, pp. 389-390, Rip, 2003, pp. 428-429). However, the labels assigned to schools and generations of STS research are not particularly relevant in the context of this paper, and will not be discussed further. Collins and Evans' three wave designation is useful for understanding their work, and I will rely on it for the time being. Their separation between *technical* and *political* phases of science-related debates will likewise be used in this section, although some objections against this terminology will be presented later on in the paper.

Collins and Evans propose that a crucial distinction can be made between the technical aspects of debates on one hand, and issues of political legitimacy (stakeholder representation, community involvement, etc.) on the other, arguing that this distinction helps define the optimum sphere of influence for experts. Early on in their 2002 paper they provide examples of 'areas where both the public and the scientific and technical community have contributions to make to what might once have been thought to be purely technical issues'; 'should you eat British beef, prefer nuclear power to coal-fired power stations, ... vote for politicians who believe in human cloning, support the Kyoto agreement, and so forth' (their use of propositional statements as examples of science-related disputes is notable and will be examined in Section 2) (2002, p. 236). Collins and Evans argue that the purely technical aspects of such questions should be isolated and left up to experts (scientists and technologists), and that the technical questions can thus be treated separately from non-technical questions (moral, ethical, social, etc.), on which technical experts have no special authority (2002, p. 236). Collins and Evans' three wave analogy, then, refers to the challenge of isolating the technical aspects of debates, and restoring the authority of experts on technical

questions, while at the same time utilising wave two STS research, which they presents as having 'dissolved the boundary between experts and the public' (2002, pp. 235-236). Collins and Evans wants to build on the insights gained in previous STS research – which has opened up for wider public participation in science-related governance – but they also want to ensure that experts are given due authority on technical issues. Because wave two research has shown that accredited technical experts are sometimes surpassed in relevant knowledge by non-accredited members of the public in science-related disputes, the central challenge in wave three will be to identify and recognise such previously neglected persons as experts (although not necessarily as *scientific* experts, see below). The challenges connected with separating non-experts from persons whose knowledge and abilities enable them to contribute to technical decisions, but who cannot be identified as experts based on certificates, is referred to as the 'Problem of Extension' (2002, p. 235). The motive for the third wave of science studies is to move from *descriptive* to *prescriptive* statements about the role of expertise in the public sphere (2002, p. 240).

Crucial for understanding Collins and Evans' article is their premise that 'the pace of politics is faster than the pace of scientific consensus formation' (Collins and Evans, 2002, p. 269). This means that at times there will be a need for technical decisions on matters whereon no established textbook science exists. Collins and Evans state that the esoteric sciences is be the natural point of departure for explaining the benefits of the wave three approach, arguing that it is possible to 'work outward' towards the wider category of '"public domain sciences and technologies" (those who directly affect, rather than merely being of interest to, the public)' (2002, p. 242). The focus on esoteric sciences allow Collins and Evans to explore the boundaries between those accredited scientists who can contribute to developing areas of research within disciplines, and those who cannot. The authors define 'core-scientists' as small groups of researchers who are deeply involved in research related to a given problem,

thereby separating them from disciplinary colleagues who lack the relevant specialist knowledge to address the particular esoteric problem area which a publically debated science-related issue centres on. Collins and Evans claim that this recognition is central to the principles of 'Western scientific society'; core-scientists are the ones who are best suited to judge on technical aspects of esoteric debates, and identifying those groups is therefore essential for discriminating between disagreeing practitioners within a field of research (2002, pp. 242-243).

Collins and Evans not only want to distinguish scientists from core-scientists, but also to separate between expert and non-expert *publics*. They argue that wave two STS research has shown the importance of discriminating between legitimate and illegitimate influence from public groups over science-related decision making and that demarcation criteria must be able to account for the expertise of citizens who are not accredited scientists. Several well-known case studies from wave two STS research has shown that stakeholders without formal qualifications are sometimes able to contribute to knowledge creation, either by shifting the focus of research or by pointing out previously unknown processes, in developing branches of science (see, for example, Michael Bloor (2000) on the recognition of miners' lung disease and Steven Epstein (1996) on AIDS activists' influence over drug testing processes). Collins and Evans focus on one such famous case study by Brian Wynne (1996) concerning the responses from Cumbrian sheep farmers to official views about radioactive contamination after the Chernobyl disaster. Exemplifying their notion of lay expertise as a category distinct from that of scientific expertise, Collins and Evans state that Wynne's sheep farmers had relevant knowledge about sheep ecology and about the behaviour of rainwater on the fells, and that they thus possessed knowledge that was 'relevant to the discussion of how the sheep and the fells should be treated so as to minimize the impact of the contamination' (Collins and Evans, 2002, p. 255).

While all of the above contributions came from members of the public who were not scientific experts, each case raised concerns about how one might be able to classify the kinds of knowledge and proficiency possessed by citizens so as to make it comparable to the expertise of scientific practitioners. It can be noted that Collins and Pinch (2005, p. 153) show that in the case of the AIDS activists described by Epstein (1996), some patient activists were actually able to attain specialist *medical* expertise, and as such they contributed to an esoteric science on the same terms as core-scientists. The point of Collins and Evans (2002), however, is to show that one might establish ways to discriminate between legitimate and illegitimate contributions from public groups based on their level of expertise, with the result that public participation in science-related disputes can move from being based purely on stakeholder representation, or membership of certain groups, to being based on forms of expertise. An important inference from this is that third wave demarcation criteria will in some cases recommend *less*, rather than *more,* public involvement in science-related disputes (Collins and Evans, 2002, p. 271).

Types of technical and lay expertises are established in subsequent publications by Collins and Evans. The authors have also published practical experiments which test the validity of these new categories. Collins presented a paper in *Phenomenology and the Cognitive Sciences* where he launched the category of 'Interactional Expertise' as the ability to 'converse expertly' about an area (such as a science) to which one is not able to contribute practically, denoting this form of expertise as the defining characteristic of sociologists of science, specialist science journalists and other groups who do not themselves practice laboratory science (2004, p. 125). The paper presents several theoretical propositions regarding interactional expertise. In a response to Wittgenstein's famous statement that if a lion could speak we would not understand it (originally referring to the radically different mental ordering of the world amongst humans and lions), Collins suggests that the underlying

reasons for the miscommunication is the different ways in which lions and humans *embody* knowledge, going on to explain that the purpose of increasing one's interactional expertise is to transcend the boundaries of embodiment (2004, p. 130).[3] A series of experiments designed to test the notion of interactional expertise have also been published by scholars at CSSS (Collins, Evans, Ribeiro and Hall, 2006). This paper presents imitation games as a method for identifying the interactional expertise of a group of subjects, testing whether colour blindness and perfect musical pitch can be credibly hidden or faked, respectively. The results show that colour blind persons, who are immersed in a culture whose embodied knowledge of colours is different from their own, are able to describe the feeling of having normal colour vision. On the other hand, those who do not have perfect musical pitch are not able to mimic this ability due to their lack of constant exposure to people who possess this (very rare) skill. These results indicate the importance of interactional expertise as a meaningful knowledge category in its own right, thereby echoing the arguments made by Collins on previous occasions.

Collins and Evans' 2002 article emphasised the importance of interactional expertise as well, using Wynne's case study of Cumbrian sheep farmers to illustrate its importance. While Wynne had pointed to the reluctance of scientists from government departments to take the views of sheep farmers into account, Collins and Evans claimed that the miscommunication between sheep farmers and scientists was in fact due to the reluctance of the latter group to 'develop or to use' interactional expertise (2002, p. 256).

Several experiments with interactional expertise are presented in Collins and Evans' *Rethinking Expertise* – a title particularly significant for proposing a 'Periodic Table of

[3] A point made in reference to the idea of 'embodied knowledge,' as presented by Collins (1985), as the sum of tacit knowledge inherent in the mastering of a field of expertise, and *not*, obviously, in reference to the hope that humans and lions would one day have meaningful conversations facilitated by interactional expertise.

Expertises' (2007, p. 14) based on early SEE-oriented research. The periodic table combines the classification of degrees of expertise within a narrow field of research (contributory and interactional expertise being the highest) with other criteria (Collins and Evans, 2007, p. 13-15). Amongst these are the presence of cultural membership and the ability to navigate in a given society, personal dispositions such as 'linguistic fluency' and 'analytic flair,' 'meta-expertise' – the different levels of professional discriminatory engagement with expertise (related to the type of discrimination performed by judges who discriminate between testimonies) and 'meta-criteria,' such as credentials and track record. Collins and Evans thus attempt to analyse the notion of expertise by explaining how the influence of cultural factors and personality traits can be categorised alongside the proficiency attainable through formal training.

2.1.1. SEE: The Right Way Forward?

In this section I have given a brief outline of the central concepts and approaches to expertise that have been suggested by Collins and Evans between 2002 and 2007. Throughout this period the two scholars have attempted to re-evaluate the concept of expertise, arguing, firstly, that previous STS research had failed to acknowledge the importance of limiting public involvement in certain science-related disputes and, secondly, that the task of identifying and protecting new categories of expertise is an important and logical next step for STS. The most enduring category suggested by Collins and Evans so far is *interactional expertise* – a type of proficiency which has been said by the two to be of central but previously unrecognised importance – not only to science studies, but also to several other social institutions, such as journalism, law and education, as well as to much of the activity done by scientists outside the laboratory, such as peer review and research funding assessments. Some experiments have already been conducted to evaluate the existence and

nature of this category of expertise, and I have described these early manifestations of SEE research as they have been carried out at the Cardiff School of Social Sciences.

While there has been a great deal of criticism towards Collins and Evans' prescriptive statements and towards their catchy but distorting[4] characterisation of previous STS research in the three wave analogy, there is no reason to doubt that their perceived need for new ways of thinking about experts and non-experts is shared by many leading STS researchers. For example, in what is otherwise a highly critical analysis of both the arguments and 'rhetorical strategies' employed by Collins and Evans (2002), Arie Rip (2003, p. 419) states that the two are right in claiming that 'there is expertise ... which is not recognized by certification,' 'that more "extension", i.e. more participation by non-specialists, is not always better,' and that 'a normative theory of expertise [is therefore] an important challenge for science studies at the present time.' Likewise, while characterising Collins and Evans' (2002) prescription for the problem of extension as 'fundamentally flawed,' Sheila Jasanoff maintains that their identification of new problems for the field of STS is 'undoubtedly important' (2003, p. 398). The fact that 'The Third Wave of Science Studies' has become the second most cited paper in the history of *Social Studies of Science* (Collins and Evans, 2008) is another indication that its authors addressed pertinent challenges for STS at the time of its publication.

If we can establish, then, that SEE was borne out of the genuine need for the field of STS to find new ways to address the problems of legitimacy and extension, the steps that Collins and Evans have made towards a normative theory of expertise should be considered for its possible practical implications for the appointment of experts in science-related decision making, as well as for its possible implications for the conduction of STS research and for the future potential of this field for understanding the relationship between scientists

[4] The authors acknowledge that the three wave categorisation paints the field of STS with a very broad brush (Collins and Evans, 2002, p. 237).

and publics. The shared sense of relevance and urgency amongst otherwise dissenting STS researchers shows that the discipline is approaching a crossroads with regards to the practical implications of STS research for science-related governance. I argues, therefore, that the developing orientation towards SEE needs to be scrutinised not only for its potential benefits in terms of addressing the problem of extension, but also for what might be lost when researchers aim towards prescriptive classifications of who are, and who are not, experts. If SEE really is the way forward for STS, it is crucial to identify its shortcomings at this early stage, so that the field might contribute to science-related governance in ways that do not conflict with the analytical insights from what Collins and Evans refer to as wave two research.

2.2. Criticisms

This section investigates some of the criticisms that have been raised against Collins and Evans' approach to understanding expertise. In an attempt to contribute to their project of understanding the relationship between experts and publics, subsequent chapters will discuss framing-oriented approaches that are complementary to SEE in terms of addressing some of the most important criticisms that have been raised against Collins and Evans. Given that the objective of this article is to contribute to the understanding of how STS research might contribute to the productive use of expertise and public involvement in governance, it is important to start out by distinguishing between relevant and irrelevant criticisms of SEE.

What is most interesting in our context is to examine the long-term significance of SEE-oriented research for the relationship between STS and the resolution of science-related disputes. To combine a normative classification of expertise with key insights from STS into such diverse areas as the complexity of social and material agency in science (Latour, 2005), the co-production of scientific knowledge and cultural communities (Shapin and Schaffer,

1985) and the gendered nature of knowledge (Haraway, 1996), to mention a few, is a bigger challenge than what Collins and Evans seem willing to acknowledge. A normative theory of expertise that does not take such highly diverse STS research into account could hardly do justice to the insights gained about the relationships between knowledge production and society.

This is the larger issue raised by Collins and Evans recent activity, but it is one which has been overshadowed by the many assaults on the details of their 'rhetorical strategies'[5] and broad-brushed analytical approach. If one accepts, as Collins and Evans have stated on several occasions, that SEE in its current form is merely a starting point for addressing important challenges,[6] such as the problems of legitimacy and extension, then one should attempt to look beyond the current problems of internal consistency in their suggestions, and instead focus on the implications that the realisation of their goal – a normative theory of expertise – might have for STS and its potential for contributing to science-related decision making. The key concern in this paper is not so much to criticise SEE-in-development as it is to examine the wider implications that are raised by SEE in the long term.

My discussion of the limitations of Collins and Evans' approach to SEE will therefore largely avoid criticisms that are directed towards the lack of internal consistency of their arguments, although it should be mentioned that several such criticisms have been made. For

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[5] This characterisation was made by Rip (2003), who took issue with Collins and Evans 'tactic of positioning themselves as offering just one approach to the Third Wave ... In presenting themselves in such an uncharacteristically modest manner, they immunize themselves against substantial criticism, arguing that there are other and better alternatives.'

[6] Collins and Evans (2002, p. 237, p. 272) state that the proposed understanding of the development of STS is just one of several possible interpretations, and also that the proposed turn towards SEE is simply one of several possible solutions to the problems of legitimacy and extension.

example, *Rethinking Expertise* was met with scepticism from scholars who protested that initial objections which had been raised against Collins and Evans' (2002) approach to the classification of expertises had not been adequately addressed in subsequent publications. Robert Crease (2007) recalls the attacks on Collins and Evans' sharp separation in 2002 between what they called the 'technical' and 'political' phases of decision making (see, for example, Jasanoff, 2003, p. 394). However, this contested dichotomy is in fact still given considerable weight in Collins and Evans' 2007 release (pp. 134-142). In a similar vein, Michael Lynch points out that many actors are involved in the creation of a single scientific contribution (apart from the authors of scientific publications, laboratory assistants, critics who help the original authors adjust their claims, funding bodies and other individuals and institutions are involved in the creation and presentation of scientific advancements) (2008), and argues that Collins and Evans' use of the term *contributory expertise* in the periodic table of expertise does not adequately define who might be said to contribute to a field. Lynch's criticism does not take Collins and Evans' individualised focus on core-scientists into account, however, and also ignores their treatment of the relationships among expertises (Collins and Evans, 2002, p. 40), wherein the category of contributory expertise is isolated in relation to other forms of knowledge-based activities.

There are a number of other criticisms against Collins and Evans which could be discussed here, and the prescriptive rhetorical style of the two authors are doubtless accomplices in provoking numerous strong responses from leading STS researchers. However, my goal is not to reject the validity of their overall argument for SEE and the normative theory of expertise. Instead I aim to investigate those weaknesses in their approach which have potential consequences for future STS research based on a normative theory of expertise. Three linked challenges to such an approach will be emphasised here; that of incorporating the positive arguments for public involvement in science-related governance,

the challenge of accurately defining the cultural justification for a normative theory of expertise, and, lastly, including the public in the process of *framing* science-related issues. I will illustrate the importance of these criticisms by drawing on the European Commission's (2002) principles and guidelines for the use of expertise, a document which shows attentiveness to public involvement at all stages of science-related governance.

2.2.1. Challenge 1: Arguments for Public Involvement

One criticism raised by Jasanoff against Collins and Evans' approach is directed towards their 'exceedingly narrow formulation of the purpose of public participation in technically grounded decision-making' (2003, p. 397). Their motivation for public inclusion seems to be limited to that of recognising the types of expertise public groups might possess. However, this is a limitation which ignores several positive arguments for public involvement in science-related decision making.

Collins and Evans' attentiveness to the 'visible relevance [of science and technology issues] to the public' (2002, p. 236) is conditioned by the democratic principle of citizen participation, yet the authors fail to properly address the multitude of reasons for public involvement in governance, concerning themselves only with the identification of *expertises* among the public and not with any other arguments for social engagement. Contrastingly, Jasanoff points to several motives 'for wider lay participation in expert decision making' (2003, pp. 397-398); public involvement adds transparency and democratic legitimacy to the activity of institutions – an important argument given the above demonstration of how institutions affect knowledge production – and participation helps disseminate expert knowledge, thereby 'producing enhanced civic capacity and deeper, more reflective responses to modernity.' This reasoning is related to her writings on 'civic epistemologies' – a term used to capture the basis on which publics assess and attribute authority to truth claims

grounded in science (Jasanoff, 2005, pp. 247-271, 2003, p. 394). She also brings up two arguments that are central to the context of this paper; first, public engagement serves as a check on the way that issues are formulated, thereby helping to ensure that the influence of experts are confined to the sphere of relevant technical decisions; secondly, public participation allows expert knowledge to be held to cultural standards for what constitutes 'reliable public knowledge.'

Jasanoff's objections are less focused on the desire for technically sound judgements and more on the underlying principles of democratic thought than what can be said for Collins and Evans. Her considerations are similar to those expressed by the European Commission in 2002, when the importance of public understanding and acceptance in decision making processes were given high priority in the Commission's guidelines for the collection and use of expertise (European Commission, 2002). Acknowledging that the interests of stakeholders often go beyond what can be said to be *scientific* in relation to decision making where expertise is needed, and noting that complex issues often require multi- or interdisciplinary cooperation and that further challenges are posed by the cultural and institutional diversity across Europe, the Commission recommended a focus on planning, dialogue between experts and stakeholders, as well as administrative transparency 'in relation to the way issues are framed, experts are selected, and results handled' (European Commission, 2002, p. 1, p. 4, p. 7). In the Commission's guidelines, the identification of expertise, which Collins and Evans deemed central to science-related governance, is a problem area outweighed by the considerations of accountability and issue framing, both of which are regarded as being of central importance for legitimising executive decisions. No equivalent concern is raised by Collins and Evans in their aforementioned publications.

2.2.2. Challenge 2: Defining Westernness

Collins and Evans rely on vaguely defined notions of 'Western scientific society' and 'Western society' to justify the special authority that they want to give experts on issues of truth in science-related disputes. In 'The Third Wave of Science Studies' they state, in connection with core-sets, that:

> [I]f one takes a really esoteric scientific controversy such as that over the detection of gravitational waves, ... then members of Western society know, without having to agonize, that anyone who is not a recognized physicist with a great deal of equipment or special theoretical knowledge will not be, and *should* not be, counted as a member of the set of decision-makers in respect of the *scientific* knowledge itself (2002, p. 242).

In the quoted passage the term 'Western society' is used to designate the supposed public consensus from which a normative theory of expertise can draw support, and as such Collins and Evans attempt, implicitly, to show that their theory is embedded in an existing cultural framework, reminiscent of what Jasanoff refers to as civic epistemology. This particular aspect of their analysis remains undeveloped in *Rethinking Expertise*, which states that those who rely on unscientific truth statements (Collins and Evans' example of this is newspaper astrology) are simply committing 'social mistake[s] – they do not know the locations in our society in which trustworthy expertise in respect of the influence of the stars and planets on our lives is to be found' (Collins and Evans, 2007, p. 46).

While it might be said that Collins and Evans have a fair and straightforward point – the authority of experts on truth statements is usually uncontroversial when it is applied in governance consultancy in developed countries – their concept of Westernness proves elusive when one attempts to define its precise meaning in historical, geographical and cultural terms. This is a problematic terminological weakness, because Collins and Evans rely on the

perceived values of this undefined Western society as the single extraneous justification for their normative theory of expertise. Once they have provided a culture-specific alibi for science as the undisputed authority on truth claims, they maintain an exclusive focus on those criteria for selecting experts that are already endogenous to scientific practice.[7]

A valid question regarding the cultural alibi Collins and Evans give for their normative theory of expertises is whether the two authors' determined commitment to 'Westernness' is unnecessarily narrow, and if their criteria for demarcation between experts and non-experts might actually be applied to non-Western cultural settings as well if this restriction could be lifted.

2.2.3. Challenge 3: Issue framing

As mentioned earlier in this chapter, Collins and Evans list several propositional statements as examples of science-related issues on which controversy might arise in the public sphere. Their approach to the separation of experts from non-experts is based on the presumption that the *technical* aspects of questions such as 'should you eat British beef?' and 'should you support the Kyoto agreement?' can be separated from the *political* aspects, on which the public should have authority over experts. However, the reduction of science-related issues to

[7] The other factors Collins and Evans bring up to justify their categorisation of expertises are all based on criteria which are internal to academic reasoning and procedures that are widely practiced in academic circles . Their categories of discrimination (2007, pp. 45-76) is one example of this, being based on the methods by which different groups of judges (magistrates, peer-reviewers, advisors in granting bodies, etc.) discriminate between the claims of different experts. Another example is Collins and Evans' ordering of expertises according to the standards of established academic disciplines, illustrated by their categorisation of laypersons' knowledge as a deficit form of academic knowledge (2007, pp. 18-35).

propositional statements does not adequately address the process by which scientific issues are made into items of public contestation.

This is demonstrated by Wynne (2003), who states that Collins and Evans misinterpreted his case study of Cumbrian sheep farmers when they pointed to the lack of interactional expertise as the main reason why communication between the sheep farmers and scientists did not succeed. Wynne argues that Collins and Evans failed to recognise the key observation in his study of Cumbrian sheep farmers, namely that the framing of science-related issues (a process which determines what will constitute relevant knowledge) is in many cases left to institutions by default (Wynne, 2003, p. 405). By extension, then, the diversity of possible interpretations of any given issue among public groups cannot be taken into account by Collins and Evans' proposed normative framework for selecting the relevant experts for a given question, because this framework starts out on the assumption that the framing of questions is a straightforward exercise.

Jasanoff raised an analogous criticism, claiming that Collins and Evans' focus on the identification of 'core-sets' in science-related disputes is misguided, and that the challenge of identifying the right experts is almost always overshadowed by the vastly more pressing questions of 'what is going to count as relevant knowledge in the first place' (Jasanoff, 2003, p. 395).

The views of Wynne and Jasanoff resonate with those presented by the European Commission (2002). In contrast to Collins and Evans' focus on prepositional questions as idealised notions of science-related disputes, the principles and guidelines for collection and use of expertise by the Commission emphasises the importance of the procedures for the consultation *process*, rather than simply its outcome (2002, p. 3). The Commission considers awareness of the issue framing process to be of central importance for the legitimisation of policy decisions, because the framing process determines the extent to which expert advice

will be required to address a given contentious issue. Provided that the authority of experts on science-related issues will by necessity infringe on the authority of public opinion, and given that the framing of issues is a nontechnical task, the process of identifying and framing relevant issues must be democratically justifiable. Such justification can only be provided on the basis of culture-specific conceptions of what constitutes relevant truth, or what Jasanoff refers to as a 'civic epistemology: the criteria by which members of [a given] society systematically evaluate the validity of public knowledge' (2003, p. 394). The process of identifying experts, which Collins and Evans focus on, only becomes relevant *after* issues have been framed in ways that are acceptable to the public. Addressing the process by which science-related questions are formulated in the public sphere might therefore serve as an important complementary approach to SEE-oriented research.

2.3. Conclusion of Chapter 2

I have now presented the ideas and concepts of SEE and Collins and Evans' normative theory of expertise. The ambition of these authors is to move STS into a proactive position where knowledge about the interaction between scientific communities and public groups is employed in the search for experts and types of expertise that have relevance in science-related disputes. A key challenge identified by Collins and Evans is that of categorising the types of non-scientific, public knowledge that has been identified in several STS studies, and as a response to this issue they have published a periodic table of expertises wherein lay knowledge is made comparable to scientific categories of expertise. Collins and Evans have also suggested that interactional expertise should be considered a relevant knowledge category in its own right, arguing that the ability to mediate tacit knowledge is an important but largely unrecognised form of expertise.

The second section of this chapter has presented three linked criticisms of Collins and Evans' approach. Firstly, Collins and Evans do not consider the positive arguments for including publics in science-related governance so long as these arguments are not based on technical considerations, and they thereby subordinate democratic principles to scientific ones in their attempt to create formal standards by which non-experts should be excluded from the technical phases of decision making. Secondly, the authors do not formulate a clear cultural justification for the construction of a normative theory of expertise, presenting instead undefined notions of basic tenets of 'Western society' and 'Western scientific society' to justify the place of their normative theory of expertise in decision-making processes. Thirdly, Collins and Evans' approach overlooks the framing process which precedes the phase of technical problem solving, and as a result of this their normative theory of expertise risks further enabling policymakers to effectively exclude publics from participating in decision making by formulating problems in technical terms.

While each of these criticisms are individually important, they are also linked together by the common focus on the *contextualisation* of scientific knowledge and practice. Public participation, the perceived 'Westernness' of science, and the framing processes inherent in research planning – all three points are related to the links between scientific claims and the perceptions and concerns of publics and stakeholders. This is seen most clearly in Wynne's objection to Collins and Evans' interpretation of his case study of Cumbrian sheep farmers. Wynne stated that it was not the lack of a certain type of competence (namely interactional expertise) that caused the breakdown in communication between sheep farmers and scientists, as Collins and Evans would have it. Instead, Wynne argues that the key analytical insight in his case study was that established institutional practices for addressing disputes by default contextualised science-related issues in ways that favoured scientific world views over public conceptions of what were the relevant concerns; this indicated that scientific practitioners

needed to be held accountable for the way in which they formulated problems in the public sphere.

Wynne's criticised Collins and Evans' lack of attention to the framing of scientific disputes as a central component in debates on science, but he did not present a comprehensive understanding of the many ways framing processes affect public conceptions of science-related issues. The following chapters will offer a more detailed understanding of how framing relates to the problems of SEE discussed above.

3. Framing

The previous chapter presented the third wave of science studies as it has been described by Harry Collins and Robert Evans (2002). I explained their reasons for wanting to establish new ways of demarcating experts from non-experts and discussed their suggestions for how such demarcation might take place. I also presented some limitations in their approach, drawing primarily on objections raised by Brian Wynne (2003) and Sheila Jasanoff (2003), who have criticised Collins and Evans for their lack of engagement with the epistemological basis on which public truth judgements are made. Both of these authors argued that Colins and Evans should be more attentive to the formulation of issues in the public sphere, as the seemingly neutral description of a science-related problem or challenge might actually contain value-laden statements which help determine the appointment of relevant experts and inclusion of public participants in science-related governance. The notion of framing was brought up by Wynne, although he did not offer a definition of the term or any demonstration of how it could by applied to the problems of legitimacy and extension.

The purpose of this chapter is to explore the concept of framing and its relevance for the debate surrounding Collins and Evans' prescriptive turn in STS. I will show how framing-oriented approaches, such as framing analysis and public involvement in framing processes, might facilitate the understanding of civic epistemologies in relation to science-oriented disputes, thereby indicating ways in which framing-oriented STS research can be used as a supplementary tool for facilitating the communication between experts and publics.

I will begin by defining the concept of framing and showing its modern use, before moving on to the relevance of framing processes for understanding science-related disputes. I will focus in particular on the ways that media and public groups rely on framing to advance their views, demonstrating the impact of media framing on public engagement with science.

Some challenges related to the use of frame-oriented analysis will also be discussed. The framing disputes within and between social activist groups will be presented as a particularly promising area of study for understanding the processes involved in the formulation of science-related issues in the public sphere – this point will also be explored further in the case studies presented in Chapter 4, where the involvement of communities in research framing will be presented as a possible approach for addressing the limitations from Chapter 2 in policy contexts relying on SEE frameworks.

3.1. Framing: Definitions and Use

The concept of framing as understood in relation to discourse analysis is commonly traced back to anthropologist Gregory Bateson (1972). However, its most elaborate early description was given by sociologist Erving Goffman, whose *Frame Analysis: An Essay on the Organisation of Experience* (1974) was the culmination of ten years of work on the relationship between meanings and the structure of experiences. It was intended as a major statement of sociological importance, but received mixed reviews at the time of its publication – particularly for its repetitive and intricate style (Fine et al., 2000, p. XXX, Goffman, 1981). Although widely cited, is still regarded as a particularly complex and enigmatic work which is frequently subjected to misreading and superficial interpretations (Scheff, 2005, pp. 369-370). However, some key ideas and approaches from his original work are easily understandable, and will be presented here.

Goffman investigated frames as those identifiable elements which together make up the definitions of social situations (Goffman, 1974, pp. 10-11). Frames can thus be understood as the unspoken sets of associations that are used to make sense of situations, statements or events – real or imagined. For example, an observation of the seemingly violent interaction between two people will be understood very differently depending on whether one invokes

the *fight* or *play* frame to interpret what is taking place. Desired frameworks are called upon in social interaction, and the constitution of official frameworks of understanding is integral to institutional relationships throughout society. An example is the infusion of patient-doctor relationships with natural (as opposed to social) perspectives, which are imposed so that the frames of understanding in which medical personnel approach the naked human body are not blurred against the other social contexts in which such contact might take place (Goffman, 1974, pp. 35-36). The notion of *frame*, then, is similar to everyday expressions such as *context* and *setting*, which help observers interpret events, the important analytical distinction being that Goffman refers to a theorised notion of what he perceived as basic mental categories, as opposed to the larger *physical* context in which some aspect of reality is being observed (although such wider contexts do, of course, influence the mental frames invoked in any given situation).

Goffman's frames must be understood in relation to his idea of 'strips,' which denote the empirical basis on which frames can be identified. His definition is relevant for our understanding of how frame analysis works, and will therefore be quoted in full:

> The term 'strip' will be used to refer to any arbitrary slice or cut from the stream of ongoing activity, including here sequences of happenings, real or fictive, as seen from the perspective of those subjectively involved in sustaining and interest in them. A strip is not meant to reflect a natural division made by the subjects of inquire; it will be used only to refer to any raw batch of occurrences (of whatever status in reality) that one wants to draw attention to as a starting point for analysis (Goffman, 1974, p. 10).

It is apparent from this passage that Goffman's frames are not simply used to understand how events are experienced and interpreted by external observers, but also to describe the meaning invested in human activity by the actors involved. It is in this light that his notion of framing

becomes relevant for the study of how science-related disputes play out in the public sphere, because Goffman gives a practical demonstration of the mechanisms at play in the presentation of statements that are seemingly purely factual. The conscious manipulation of frames of understanding is central to Goffman's *Frame Analysis*, which describes in detail the various ways in which actors might ambiguously or deceptively frame their activity to create uncertainty or misunderstandings. Similarly, people might be forced to abandon a desired frame in which their activity was meant to be presented, such as when a news anchor is forced to speed up his monologue due to sudden time constraints and as such desert any pretence of speaking normally (Goffman, 1974, pp. 348-349). Goffman calls this 'breaking frame.'

Frame analysis is presented by Goffman as the task of deconstructing strips – the object of study – and identifying underlying framing of activity and meaning, which he categorises into 'realms' such as that of the physical world and symbolic representation. *Frame Analysis* gives many examples of how observed strips might be subdivided into frames. The act of greeting a neighbour and getting in a car might be broken down into the transition between a ritual way for the individual to figure as a representative of himself and the bodily management of a physical object (1974, p. 561). Likewise, the act of throwing ones racket into the ground after a tennis foul can be considered a 'comment' on ones playing abilities (Goffman, 1974, pp. 570-571). The identification of frames is presented by Goffman as an analytical task with the purpose of examining the organisation of experience.

My objective here is to discuss how awareness of framing processes might contribute to the understanding of public involvement in science-related disputes, as well as to discuss framing in relation to the SEE debate. Some contrasts between Goffman and Wynne's use of the term framing should therefore be mentioned. Wynne writes that the crucial shortcoming of Collins and Evans is their lack of consideration for 'how public issues are framed and thus given meaning' (2003, p. 402), thereby using framing in the verbal sense as a layer of

meaning attached to a message as it is being presented. Goffman's frames can also be understood in this way, but they most often refer to the mental categories by which an actor interpret events. As such he uses the noun form of frames to describe the compartments within which actions and expressions are ordered. This difference is telling of how the use of Goffman's concepts have developed since the publication of *Frame Analysis*, and it is Wynne's usage which is prevalent in much of the literature on framing today.

The study of framing processes has grown increasingly tangible with the advance of cognitive science and linguistics, particularly as the mapping of neural computations characterising frames has become possible (see for example Jerome A. Feldman, 2006, where the identification of neural connections are used to empirically support Goffman's notion of frames as mental categories). George Lakoff, cognitive linguist and professor at the University of California, Berkeley, has written extensively on the use of framing processes in political speech, examining the effects of language on the perception of contentious issues and actively investigating the frameworks employed by participants in public debates (2004, 2008). Lakoff has been a leading figure in applying framing research to the political arena, even going so far as to establish the Rockridge Institute in order to assist the American progressive community in effectively framing issues in order for them to compete with the American political right, the latter of which, Lakoff argues, owes much of its success to a highly developed understanding of how framing affects public understanding of political issues. Many examples are given in his book *The Political Mind* (Lakoff, 2008), one being the intentional positive light cast by on tax cuts by the Bush administration's choice of 'tax relief' as the preferred designation, thereby framing the policy in a favourable light as one where a burden is removed, while at the same time removing any reference to the positive societal effects of taxes. Although the work of Lakoff has been criticised for being unnecessarily politically one-sided (Flanagan, 2008) (indeed, the intentional framing of policies can be seen

across the political spectrum, and is not simply an American phenomenon – nor is framing restricted to the political sphere, it is integral to all communication), his observations are important in demonstrating the potency of seemingly neutral, descriptive language in political speech.

3.1.1. The Framing of Science

The role of framing processes is increasingly recognised as crucial for understanding the dissemination of scientific knowledge in the public sphere. As the volume of literature on the effect of language framing on the efficiency of science communication increases (see, for example, Tania Bubela et al., 2009, Matthias Kohring and Jörg Matthes, 2002, Matthew C. Nisbet and Chris Mooney, 2007), studies of the framing of contentious science-related issues indicate that publics' perception of the relevant science, and by extension their position on contentious issues, are affected, at times strongly, by the framing used in media coverage (see, for example, Michael D. Cobb, 2005, on the effects of framing on American public opinion about nanotechnology, Urs Dahinden, 2002, and Matthew C. Nisbet and Bruce W. Lewenstein, 2002, on the framing of biotechnology, Myra Marx Ferree et al., 2002, on the contrasting influence of American and German media coverage of abortion over public opinion and understanding of the relevant medical science, and Patrick O'Mahony and Mike Steffen Schäfer, 2005, on the media coverage of human genome research).

I argued in the previous that Collins and Evans do not engage with the way in which science-related issues are framed, and that they thereby neglect to consider the basis on which publics get involved in disputes – what Jasanoff and Wynne refer to as *civic epistemologies*. This omission allow Collins and Evans to emphasise the relationship between publics and scientists involved in the technical aspects of science-related decision making as a relationship between experts: Scientific experts on one hand and representatives for various

non-scientific fields of proficiency on the other. Framing-oriented research offers an alternative way of understanding publics engage with scientific expertise, as it casts light on the fundamentally different ways in which scientists and public groups relate to scientific topics. It brings into focus the factors influencing public opinion which are normally excluded from scientific reasoning, such ethical and moral judgements, and is thereby more able to account for the epistemological basis on which publics respond to science-related disputes without accounting for public views as simply scientifically inadequate. This is the basic difference between framing-oriented analysis of science-related disputes and the normative approach professed by Collins and Evans. While framing-oriented research does not necessarily address the problem of identifying unrecognised fields of science-related proficiency amongst the public in the way shown in Collins and Evans‘ reading of Wynne’s case study of Cumbrian sheep farmers, it does facilitate the understanding of public engagement with science in ways that allow for deeper understandings of civic epistemologies on their own terms, rather than on the terms of scientific reasoning. As such, framing-oriented perspectives on the formulation of relevant science-related questions in the public sphere is a useful supplement to Collins and Evans normative classification of expertise, due to its ability to address the formulation of science-related issues.

Framing-oriented research on the interaction between publics and experts is thus useful for allowing public reasoning to be understood as *engagement with*, rather than *misunderstanding of*, science – resonating with developments in the larger field of STS. The view of publics as faulty scientists was fiercely debated by scholars studying the relationships between science and society during the 1990s (Locke, 2002), giving rise to strong criticisms of the so called ‘deficit model’ of the consumption of science among publics and the launch of alternative methods for interpreting and assessing the ways in which different groups in society engage with scientific claims (Irwin and Wynne, 1996, Locke, 1999). Framing-

oriented studies of public engagement with science have indicated that the opinions people form of scientific claims might be very heavily influenced by media framing due to the way in which journalistic framings amplify the tendency of casual readers to rely on superficial impressions to make sense of debates, relying 'heavily on mental shortcuts, values and emotions to make sense of an issue, often in the absence of knowledge' (Bubela et al., 2009). Dietram A. Scheufele and Bruce V. Lewenstein (2005, p. 661) show that this tendency is especially strong in cases where the publics' familiarity with the science involved is low, pointing to the popularity of the Greenpeace-coined label 'Frankenfood' to signify genetically modified foods as an example of how frames help publics form opinions about scientific topics on which popular scientific understanding is limited. Indeed, their study of public impressions of nanotechnology shows that the attitudes of publics are heavily influenced by the positive framings generally given to the technological and economic promise of this emerging field (receiving most of its media coverage in business and science sections of the printed press), while the factual knowledge about the risks and downsides of nanotechnology is still quite low (Scheufele and Lewenstein, 2005, p. 665). They predict that the advancement of nanotechnology will lead to a broader array of tabloid media covering the risks and potential conflicts associated with the technology, shifting public opinion accordingly.

The above discussion gives some insight into the ways in which civic epistemologies are affected by the framing of science, although it does not directly contribute to the problem of identifying lay expertises in the way addressed by Collins and Evans. However, the objective here is to investigate the mechanisms by which science-related issues of contestation are given meaning in the public sphere, and on this basis to assess and supplement Collins and Evans approach to the classification of expertises.

The challenges connected with research on framing processes relating to public opinion on science-related disputes are to a large extent linked with the general limitations of

media-based public opinion research. Susanna Horning Priest's (2006) mapping of framing processes in the media presentation of gene technologies in Canada and the United States represents one framing-oriented attempt to address the relationship between media discourse and the public's engagement with scientific claims and their subsequent participation of science-related governance through democratic participation. In a contrast to Collins and Evans, who I have earlier criticised for relying on too vague a definition of 'Westernness' and its perceived social rules of conduct with regards to science's authority on truth judgements, Horning Priests uses the similarity between Canada and the United States as a starting point for investigating how the identification with subcultures might influence the individual's stance on scientific issues to a larger extent than what can be said for cultural and demographic membership. She rejects the analytical category of 'lay public' as an oversimplification, arguing instead that individuals engage with science within the context of subcultures which, through the sharing of values and beliefs, '[change] the climate in which individual opinions are formed, [lend] expression to collective views, and [shape] the formation of public discourse' (Horning Priest, 2006, p. 57).

By contrasting the media's methods for issue polarisation via source selection (which tends to over-represent activist voices) with the survey-based knowledge that the majority population in both Canada and the United States assume a moderate view where scientific expertise is generally trusted, Horning Priest demonstrates that the views of relatively small groups of activist voices are presented as more widespread than what is actually the case (2006, pp. 69-70). Perceived differences in the values attached to gene technology is thus more connected with the differences between the organisation of activist groups in Canada and the United States than with general cultural differences between the two countries. This illustrates the challenges of determining public opinion on contentious issues by examining media coverage. It also suggests that the attempts of activist groups to frame science-oriented

discussions is an important area of study, as these groups are generally given more media coverage and, as such, proportionally more influence over the basis on which public opinion is formed than what can be said of the groups holding nuanced, moderate views. Indeed, contrary to Goffman's focus on frame analysis as a tool for understanding the ordering of experiences at the level of individuals, the frame analysis of science-related discourse might in fact be most useful in relation to social movements – especially when one deals with the debate on controversial issues in the public sphere.

This is the focus of Robert D. Benford and David A. Snow, who have done extensive research on the impact of framing processes by social movements involved in public debates on science-related topics (Benford and Snow, 2000, Snow, 2004, Snow and Benford, 1988). Benford (1993), for example, builds on observations, participation and interviews with members of twelve activist groups within the American nuclear disarmament movement, examining as frame disputes the discussions of how issues should be presented to the public and how groups should position themselves in relation to other social issues that were seen as relating to global disarmament. Benford distinguishes between two different forms of frame disputes in the context of activist groups in social movements: Those that take place within an individual group, and those involving conflict between activist groups with similar agendas. Upon focusing on the framing conflicts between individual groups, he demonstrates that three characteristic types of framing conflicts are likely to erupt (Benford, 1993, p. 679). The first conflict is related to the interpretation of problems, and was thus rooted in disagreements over the diagnosis of a certain challenge. The second conflict is over the ways problems might be solved, and over the desired strategies to be followed by individual groups. Benford and Snow (2000, p. 626) show that disagreement between activist groups is usually centred around these two, the *diagnostic* and *prognostic* framings. The third conflict likely to erupt between groups is connected with issue framing in the public sphere, reminiscent of Wynne's description, and

consists of disagreements over how reality should be presented to target audiences. Resolving the last conflict means discussing the rhetorical methods to be used to gain public support, and involves the strategic management of communication and self presentation as well as the weighing of mobilisation against the maintenance of ideological purity. Benford followed his subjects over some time, and was therefore able to identify the handling of frame disputes as a factor in the success or failure of activist groups (1993, pp. 695-196). Among the negative aspects of prolonged internal framing disputes he identifies for activist groups is membership decline due to the narrowing of ideological aims, as well as resource depletion as a consequence of time and effort deflected from the group's goals. Positive aspects of framing disputes might include the clarification of a group's stance and the promotion of critical reflection amongst its members.

The relevant point to make about the research on framing processes in activist movements in the context of this paper is that the study of frames provides an alternative, *non-scientific* point of reference for reviewing the success or failure of social movements and other actors involved in the formulation of relevant science-related issues in the public sphere. As such, framing-oriented research allows research to be conducted on the ability of science-related groupings to gain public support, without requiring the technical and scientific content underlying their diagnostic and prognostic statements to be scrutinised. On the other hand, research based on framing processes does allow the participants' strategies for presenting messages to the public to be examined – an analytical dimension absent in Collins and Evans' theory of expertises.

3.2. Conclusion of Chapter 3

I have discussed the extent to which framing processes are relevant in influencing the grounds on which publics engage with science, focusing in particular on the role of media coverage of

science-related disputes. I have argued that the understanding of how experts and public interact must allow both sides to be understood on their own terms before any separation can be made between technical and political phases of decision making, and that the basis for civic epistemologies should be approached with a degree of analytical flexibility that allows consideration for the fundamentally unscientific basis on which casual consumers of science-related media coverage might adopt viewpoints in science-related disputes. Building on the criticisms presented in Chapter 2, I have argued that Collins and Evans do not show this degree of flexibility by neglecting to address the process by which relevant issues are defined in the public sphere. I have outlined the importance of framing processes for activist movements and for public engagement with science in order to show how this is a crucial element in understanding the variety of factors influencing public opinions about science.

Framing is an important factor in influencing the ways in which information is transmitted and interpreted. Studies of how framing affects the understanding of science – both generally and with regards to the science relevant in public disputes – is clearly a useful starting point for examining the formation of the types of civic epistemologies which Jasanoff and Wynne criticises Collins and Evans for neglecting. Whereas Collins and Evans argue that science-related governance can be divided into political and technical phases, and that the general public should only be able to influence the former (2007, p. 125), framing analysis allows for a more flexible approach to the understanding of how publics form opinions about science, thus circumventing this much criticised dichotomy. By understanding discussions relating to science as revolving around the attempts of actors to *frame* issues, rather than as debates structured first and foremost around scientific reasoning where the relevant task is to distinguish experts from non-experts, one might be able to take civic epistemologies into account *throughout* the process of resolving science-related disputes.

4. Case Studies

Having examined the spectrum of possible uses of framing-oriented research for the challenges connected with SEE, I now wish to turn to some concrete examples of how the participation of local communities in the framing of risk analysis can be beneficial for publics and experts alike. I present case studies dealing with risk management, as this is a science-based activity which relies heavily on interaction with and understanding the needs and concerns of stakeholders. I will discuss two examples from Nancy L. Judd et al. (2005) where research questions related to seafood contamination were framed by University of Washington researchers working with local communities and tribal nations. In contrast with Harry Collins and Robert Evans, the challenges of weighing the opinions of scientists against those of publics are not addressed by Judd et al., whose primary focus is instead the breadth of benefits of community involvement in the framing of scientific analyses. I will relate the case studies of Judd et al. to the STS debate on expertise and show the different ways in which community participation in the framing of research questions complements the approach of Collins and Evans, focusing in particular on the three criticisms of SEE that were presented in Chapter 2. I will also use the case studies to expand on my discussion from the previous chapter on advantages and disadvantages of framing-oriented approaches to public involvement in science-related decision making. I will discuss the impact on technical aspects of research as well as on issues concerned with policy making and community knowledge, concluding that community participation in framing processes has several potential benefits for both the technical and political phases of science-related decision making. I will begin by introducing the background for the Washington case studies before discussing each of them in light of the challenges facing SEE.

This chapter operates with a narrower understanding of the concepts of *framing*, *public involvement* and *science-related issues* than has been the case in previous chapters. While I earlier gave an overview of the different understandings of framing that exists in the literature, I will here discuss framing in the sense of issue formulation, which is the way the concept is used by Brian Wynne (2003). Public involvement in framing activities will be understood as the participation of communities in the formulation of science-related issues according to their concerns. The concept of *risk management* is used with some overlap with *risk analysis*/*risk assessment*, and the relationship between these concepts are explained below. I discuss the framing of science-related issues in relation to seafood contamination for the sake of illustrating the potential for public involvement in research planning; however, the discussion at the end of this chapter is relevant for public participation in framing processes connected with other forms of science-related decision making as well.

4.1. Case Studies

Judd et al. (2005) give examples of cooperation between researchers and local communities in the framing of risk analyses connected with seafood safety. Their case studies from the State of Washington in North-Western United States (U.S.) are used to identify preconditions for successful public involvement in framing processes and for describing the benefits that might be shared by researchers and communities alike as a consequence of framing-driven research where communities participate actively in the formulation of relevant research questions. The background for their paper is the contact established between University of Washington researchers and community groups and tribal nations at the town meeting 'Voices for Healthy Environments, Healthy Communities' in 2000, an initiative launched the National Institute of Environmental Health Sciences' (NIEHS) Center for Ecogenetics and Environmental Health (CEEH) in an effort to stimulate community involvement in shaping research agendas (Judd

et al., 2005, p. 1502). The authors discuss cases where researchers working on seafood contamination and risk analysis cooperated with communities in the framing of research questions relevant both to the specific dietary traditions and needs of individual communities as well as to general public health concerns. I will focus on two cases that show publics influencing the technical phase of research through their involvement in framing activities.

4.1.1. Case Study 1: Marine Resources for Future Generations

The first example given by the authors is the Marine Resources for Future Generations (MRFFG) (Judd et al., 2005, p. 1504), a project consisting primarily of representatives from Asian and Pacific Islander (API) communities cooperating with government agencies and nongovernmental partners. The coalition includes the Korean Women's Association (KWA) and the Indochinese Cultural and Service Center (ICSC), organisations representing citizen groups where fish consumption is 3-10 times higher than average U.S. levels due to traditional diets and a reliance on subsistence fishing. As a consequence of relatively high fish consumption and the differences in sources and types of fish and shellfish amongst various groups, the API communities are more exposed to contaminants than the general population, making seafood safety an important concern. The MRFFG was initiated to improve awareness of safety issues, cooperating with the Washington Department of Fish and Wildlife in seeking to increase the awareness of problems associated with illegal harvesting and shellfish collection from contaminated beaches. All parties involved in MRFFG sought to promote education amongst API communities about the safe harvesting of seafood; however, the role of citizen groups proved crucial in the framing of relevant research questions as well as in the data collection process itself, and the effort of the MRFFG group thus actively influenced the conduction of research. MRFFG investigated the source of seafood consumed locally in order to provide the public with safety information relevant to their needs. Multilingual youth from

the coalition visited local vendors serving mostly Korean, Vietnamese, Cambodian, Samoan, and Filipino community members and asked about the sources of their seafood to determine whether it was legally harvested. Based on the information collected in these interviews, MRFFG were able to assess the level of awareness locally and also to determine that as many as 20% of stores were unaware of the health dangers associated with shellfish contamination and illegal harvesting, thus forming a basis for continued community education efforts. Judd et al. underline the effect of local initiative and involvement in shaping this research. The citizen groups KWA and ICSC helped formulate a research agenda receptive to AIP community needs through their involvement in the MRFFG. Secondly, the participation of local youth was essential in creating an atmosphere where relevant information could be extracted from shop owners in a setting where fear of legal action was minimised – reducing the suspicion generated in an interview setting where information is gathered by interviewers from outside the community (Judd et al., 2005, p. 1504).

Based on the MRFFG case description from Judd et al., we can establish that research results were influenced by local involvement in two ways: First through the framing of research and formulation of research goals receptive to community interests, and secondly through the active involvement of local participants whose role in the interviewing process determined the quality of data. Further, in relation to SEE, the case of MRFFG is an example of how public health and awareness of seafood contamination might combine in a science-related issue with a degree of complexity surpassing Collins and Evans' notion of isolable, technical and political phases.[8] Two linked goals – the mapping sources of seafood at local

[8] It should be noted that Collins and Evans' use of the term *phase* is not meant to imply a temporal sequence; 'the usage owes more to the natural science meaning, where phase refers to the different states (solid, liquid, or gas) that a material might take … In a similar way, the same decision might move between technical and political phases dependning on the context' (2007, p. 124).

vendors for the purposes of risk management, as well as the promotion of community knowledge about seafood safety and about the purposes of regulation for vendor operations – were jointly pursued by researchers and local representatives in a process where the tasks of data collection and community education were carried out in dependence on each other. As public awareness of seafood safety issues grew through the involvement of local youth in the vendor interviewing process, feedback from AIP communities helped create a clearer image of local habits for consumption, harvesting and import, in turn improving the basis for collecting further information about local seafood safety awareness. While technical knowledge about levels and sources of seafood contamination was a crucial element in the community education aspect of this case study – forming a basis for educational and awareness goals which could be measured by assessing local public health – it is important to note that the framing of research questions was made increasingly relevant to the public through the involvement of the (political) MRFFG initiative. The two phases described by Collins and Evans thus continued to affect each other throughout the project. This observation does not imply that Collins and Evans' division of technical and political phases is unsound or without merit; the case study merely illustrates just how important the process of research framing might be in involving a community throughout the resolution of a science-related issue, effectively demonstrating why the relationship between experts and publics in science-related issues cannot easily be reduced to that of making truth verdicts on propositional questions. The case of MRFFG is thus useful for showing how stakeholder involvement in data collection and research framing can lay the groundwork for community education as well as for the calibration of safety regulations in relation to local concerns.

4.1.2. Case Study 2: Bioaccumulative Toxics in Native American Shellfish

The second case study by Judd et al. to be presented here discusses research framing connected with issues of sovereignty, water and sediment contamination and community customs regarding shellfish consumption (2005, pp. 1505-1506). The Swinomish Tribe runs the research project Bioaccumulative Toxics in Native American Shellfish (BTNAS), a programme for monitoring shellfish contamination within the Swinomish Reservation – an area populated by a Native American population of around 1000, 700 of which are enrolled Swinomish members. The reservation is exposed to a number of environmental threats. Petrochemical facilities, landfills, sewer outfalls and agricultural land treated with pesticides are among the risk factors located within a mile radius of the reservation. The Swinomish Tribe commissioned studies from the Washington State Department of Ecology (WSDE) in the late 1990s in an attempt to confront local environmental hazards. The results of these investigations indicated that additional sampling was needed to map local contaminants and to assess potential health implications. This prompted the issue of sovereignty, which is very important to the Swinomish, and the planning of continued research depended heavily on the issue of project control being resolved on terms acceptable to the tribe. Due to the importance of shellfish to the maintenance of the traditional lifestyle of the Swinomish Tribe, its members wanted to be in control of research to ensure that questions relevant to them would be satisfactorily addressed and that findings would be interpreted in accordance with their interests. The community had enough resources to perform their own research, employing environmental scientists, maintaining a chemistry lab and running a shellfish monitoring program funded by the U.S. Environmental Protection Agency (EPA) and the Bureau of Indian Affairs. They were unfamiliar with the procedures for applying for federal research grants, however, and therefore requested assistance from the CEEH in order to draft a research proposal. The outcome of this process was the largest research grant ever awarded to

a tribal nation by the EPA, resulting in the successful launch in 2002 of the BTNAS project with tribal sovereignty over key research framing decisions and data interpretation (seasonal field sampling and analysis have been conducted by the project, but the results are not discussed by Judd et al., nor are the specific methodological choices of the BTNAS project). Meetings have since been organised with neighbouring tribes, offering a local context for the sharing of information about research funding and experiences with community-driven research (Judd et al., 2005, pp. 1505-1506).

The BTNAS project has led to shellfish contamination being assessed with a high degree of sovereignty and control from the Swinomish Tribe. As such it is an example of a community-based, framing-oriented approach to research design where public involvement is successful in the sense of facilitating a large degree of participation. At the same time, however, the BTNAS project also raises questions about the borders between science framing and the technical execution of research. Though Judd et al. emphasise that the technical carrying out of research and contamination assessment was in this particular case performed by qualified scientific personnel employed by the Swinomish Tribe (2005, p. 1506), the issue of Swinomish control over data collection and interpretation – perceived as highly important to the tribe – might still be viewed as an interest conflicting with scientific ideals of objectivity. The involvement of public groups in framing activities opens up for political influence, and as such there is a potential conflict between public participation in framing activities and the integrity of what Collins and Evans refer to as the technical phase of science-oriented decision making. Collins and Evans' criteria for demarcating experts from non experts therefore remain crucially important. Without making judgements about the scientific practice in the case of BTNAS, it is useful to keep in mind the degree of power which can be exerted by those in charge of research framing.

4.2. Key Contrasts and Challenges

Judd et al. focus explicitly on framing in the area of *risk management*, [9] a field where the communication of research results to the public is important and where a significant potential for public involvement exists. The BTNAS and MRFFG projects are successful in terms of enabling local communities to promote research on issues that are important for upholding cultural and historical ways of life connected with seafood consumption. Judd et al. summarise the advantages of community participation in framing activities by focusing primarily on its value for stakeholders through strengthening public awareness and knowledge levels; however, they also emphasise the benefits related to successful localisation, which include technical aspects of research planning tailored to local concerns. In this respect their approach is fundamentally different from that of Collins and Evans, whose primary goal is to identify and exclude non experts from the technical aspects of science-related decision making. The key difference between the objectives of public involvement in framing and the approach of Collins and Evans can thus be characterised as one between fostering the *most contextually relevant* science versus that of ensuring the *most expert-based* one. My argument

[9] The distinction between *risk management* and *risk analysis*/*risk assessment* has been criticised by STS researchers who disagree with the notion that only the former category includes social elements, such as those inherent in policy implementation, while the latter categories are purely scientific, and thereby largely detached from social influence (see, for example, Judith A. Bradbury, 1989, Sheila Jasanoff, 1987). Judd et al. operate with the concept *risk management* only, despite the fact that both the MRFFG and BTNAS case studies show the influence of public groups over the analytical (or *technical*, to use the terminology of Collins and Evans) aspects of risk assessment. While I copy the usage of Judd et al. when paraphrasing and summarising their arguments, I also use the term *risk analysis* in my analysis to signify the technical aspects of risk assessment.

here is that the two approaches can be meaningfully combined to address technical as well as public concerns.

Some challenges connected with the public involvement in the framing of science-related issues should be addressed based on the case studies discussed. Judd et al., emphasise in particular the significant investments of time and resources that are needed to identify opportunities for the involvement of communities in framing activities at an early stage of risk management processes (2005, p. 1507). As previously noted, productive connections were established between University of Washington researchers, tribal nations and other community groups at one of the many town meetings organised across the U.S. by the NIEHS – meetings initiated to improve the receptiveness of research projects to the needs of local communities. However, while this initiation has proved successful in enabling several communities to initiate framing activities related to environmental health risk management, the engaging of stakeholder communities in the framing of research questions at an early stage of the risk management process represents a significant cost, which must be justified to funding agencies in turn (2005, p. 1507). Building awareness of the benefits of public participation in framing thus represents a major challenge for the realisation of framing-oriented approaches to public involvement in science-related decision making.

4.3. Relevance for SEE

The two case studies presented here indicate that a framing-oriented approach to research planning accommodates civic epistemologies by allowing the framing of research objectives to be performed by stakeholders as a nontechnical task at the planning stage of research. As such, the criticisms that were raised against Collins and Evans in the Chapter 2 can be addressed through increased attention to framing processes in SEE-oriented research and in

decision making contexts where approaches from SEE – such as the periodic table of expertises – are employed.

The first criticism discussed in Chapter 2 was directed towards Collins and Evans' neglect to consider the positive arguments for public involvement in science-related decision making – an omission grounded in their exclusive focus on *expertise* as the sole contribution of publics to the technical phase of science-related issues. While the two authors are clearly justified in considering the ability to contribute to a field of expertise a key criteria for demarcating experts from non experts, their discussion of lay expertises reveals a very limited conception of the arguments for public involvement in science-related decision making. The implication of this narrow focus is that SEE-oriented research might overlook the full spectrum of benefits of public participation – focusing instead on such participation as exclusively a matter of including lay expertises and other forms of proficiency that are included in the classifications of the periodic table of expertises. Sheila Jasanoff (2003, pp. 397-398) criticises Collins and Evans for underestimating the need and potential for 'enhancing civic capacity' through public involvement in such processes, arguing that citizen participation is an important element in the dissemination of scientific knowledge to the public. The MRFFG case study demonstrates her point by exemplifying opportunities for improving community knowledge on critical issues, while at the same time illustrating how public inclusion might impact the technical phase of research. Through involving AIP groups in research framing and enlisting local youth to collect relevant data, the MRFFG initiative achieved large and high-quality response rates from seafood vendors (benefitting the research project) as well as a general increase in community awareness of seafood safety concerns (benefitting the community).

The second objection raised against Collins and Evans in Chapter 2 was related to their use of the term *Westernness* to describe a kind of cultural alibi for the project of

identifying categories of expertise. I criticised their failure to provide a clear definition of the term, arguing that their usage is unnecessarily restrictive and that it implies that the periodic table of expertises holds only limited geographical or cultural validity. For example, their elusive usage of the term is problematic when dealing with what is generally considered non-Western minority cultures within larger Western cultural or geographical settings, such as is the case in the process seen in the MRFFG case study (which looks at Asian and Pacific Islander communities in the State of Washington). Because the framing of research questions to accommodate the needs of stakeholder communities can be performed as a nontechnical task, Westernness does not represent a relevant concern for the inclusion of community groups in framing activities, and the cultural understanding of Westernness – a restrictive element in Collins and Evans' analysis – can thus be ignored in a framing-oriented perspective.

Nonetheless, it remains evident that civic organisations that are widespread in developed countries remains important for the successful inclusion of publics in research framing; the MRFFG and BTNAS case studies show that a highly developed civic society might enable communities to initiate and participate more actively in framing processes. As was shown earlier in this chapter, both cases started with the active involvement of organisations representing the local communities concerned with seafood safety issues. It is likely that less organised communities will have difficulty mobilising and raising their concerns. This is not only a challenge for public engagement with framing activities, and it is also evident in other forms of public involvement in science-related decision making. In discussing the potential for implementing community-based participatory research projects in China, for example, Robbie Ali et al. (2008, p. 1283) emphasise the general lack of civic groupings as a potential hindrance for citizen mobilisation and suggest that state initiation and

leadership is vital for any successful coordination of community involvement in research processes there.

The third criticism discussed in the previous chapter revolved around the problem of issue formulation. This is the area where public involvement in framing activities most clearly complements the SEE approach. Wynne (2003) accuses Collins and Evans of neglecting the process of issue formulation altogether, arguing that the authors attempt to address science-related issues by breaking them down into their political and technical components without questioning the process by which the issues are defined in the first place. He criticises Collins and Evans' neglect of the potential for political, social or other influences being inherent in the initial phase of issue framing. This same consideration is also present in the principles and guidelines for collection and use of expertise published by the European Commission (2002). The Commission emphasises the importance of public inclusion in the phase of issue framing, noting that this form of community involvement is important for the accurate formulation of scientific research which is responsive to social needs and concerns.

The MRFFG and BNTAS case studies are examples of successful involvement – from the point of view of public participation and democratic legitimacy – of publics in framing activities. The MRFFG project collected detailed information about the sources of seafood sold at local vendors and about the levels of knowledge about contamination issues in the AIP community, while at the same time raising public awareness of such issues amongst stakeholder groups. The BTNAS project shows a more independent approach to research framing by the Swinomish Tribe, who initiated and executed shellfish monitoring projects following the external WSDE assessment of local contamination. In accordance with the strong desire of the tribe for sovereignty and control over the formulation of research goals and the interpretation of data, the BTNAS project was realised following external assistance on the technical aspects of the federal grant application process, but executed through the use

of scientific expertise from members of the tribe. Without discussing the specifics of the BTNAS project, we can establish that complete stakeholder control of research projects might potentially conflict with the ambition for scientific neutrality which is implied in Collins and Evans' designation of a technical phase of research.

4.4. Conclusion of Chapter 4

While the earlier parts this paper has focused on the breadth of meanings associated with framing, I have used this chapter to discuss the concept in the sense of issue formulation, a usage consistent with the criticisms of Collins and Evans raised by Wynne (2003). The discussion has been based on the MRFFG and BTNAS case studies involving Asian and Pacific Islander communities and the Swinomish Tribe in the State of Washington, representing two different degrees of involvement in research framing that have been used to illuminate some of the potential benefits and limitations of public involvement in research-framing processes. I have related each of the case studies to the criticisms of Collins and Evans' and SEE that were discussed in Chapter 2, arguing that community involvement in research framing – particularly when this involvement is directed through organisations representing stakeholder interests – has the potential to complement Collins and Evans' approach with regards to three strands of criticism that has been directed towards SEE. Public participation in framing processes need thus not represent a direct contradiction of Collins and Evans' analysis, but it potentially assists STS researchers and policy makers through addressing the weaknesses in the SEE approach that were highlighted in Chapter 2.

I have stated elsewhere in this paper that a common theme in the many criticisms that have been raised against SEE is Collins and Evans' lack of engagement with the contexts in which scientists and communities interact. The authors set out to construct boundaries between experts and non experts without taking into account the messy contexts from which

contestation arise on the understandings of what are the relevant concerns of parties involved in science-related issues, basing their analysis instead on the assumption that the technical aspects of debates can be isolated and thus treated separately from political, social and other influences. However, if one accepts that science-related issues might be grounded in the collision of knowledge systems, such as between that of scientific approaches and civic epistemologies, then it seems that a complementary approach is needed to analyse the phase of issue formulation. I have argued that attention to framing processes might serve as a useful *analytical* tool for STS in this context. Furthermore, the case studies of MRFFG and BTNAS indicate that the interaction between researchers and community groups in framing activities might also be used as a practical, *facilitating* tool in science-related decision making.

5. Conclusion

In his lamentation over the intrusion of publics into the sphere of experts that has in recent years been facilitated by the fast development of user-based media, Andrew Keen recounts the 'edit war' that took place between University of Cambridge climate modeller, Dr. William Connolley, and an anonymous Wikipedia editor, over the site's global warming entry (2008, p. 43). After having repeatedly attempted to correct factual inaccuracies, Connolley was accused of promoting a subjective 'point of view' and put on editorial probation – a consequence of the site's practice of giving all users the same level of credibility regardless of their expertise. Keen sees the treatment of Connolley as a symptom of an increasing tendency in our society to undermine experts which 'threatens the very core of our professional institutions' (2008, p. 44). In his view, science is not the only sphere of expertise threatened by this trend. The integrity of art, music, even *culture itself,* is at stake.

Faced with the grim prospects of epistemological and moral decay, it is easy to see the motivation for wanting to construct boundaries to protect the authority of experts and for wanting to appoint cultural gatekeepers to assess the quality of claims made in the public sphere. Harry Collins and Robert Evans have made an important attempt at moving the attention of STS from what they perceive as the intense focus of wave two research on the revelation of social influences over the scientific process, and over to a third wave of research focusing more on the problems connected with distinguishing between publics and experts. The intense debate sparked by their launch of SEE attests to the perceived importance of the problems they have addressed since 2002.

Although in dissent over their wave-based terminology and over the legitimacy of their normative theory of expertises, the importance of Collins and Evans' overall task has been admitted by even their strongest critics. I have therefore focused on suggesting ways of

improving the basis on which their theory can be used, rather than on one-sidedly criticising the SEE approach. In Chapter 2 I quoted Arie Rip's negative reaction to the 'rhetorical strategies' of Collins and Evans, where he said that by suggesting that their theory offered but one approach to a problem which could be potentially addressed with other alternatives, the authors immunized themselves against substantial criticism. Unfortunately I am not able to suggest ways to address the criticisms against the SEE approach without adopting this very same 'strategy', as there are already many analytical alternatives by which STS research might address the phase where science-related debates are formulated. However, my argument, that the increased attention to issue-framing processes is a useful and necessary supplement to the normative theory of expertises, is intended first and foremost as a starting point for discussing potential weaknesses of SEE. The description of *practical* approaches that might address the three criticisms raised in Chapter 2 is in any case outside the scope of this paper, which has focused instead on the breadth of possibilities attached to framing-oriented research.

5.1. Summary

By focusing on three criticisms against Collins and Evans' approach, I have argued that there are important challenges related to the use of their normative theory of expertises. The authors conduct a detailed investigation into the concept of expertise, and are successful in establishing criteria by which non-accredited, 'lay' expertises might be made comparable to the proficiency of trained scientists (or indeed to the contributors to any field where a degree of attainable skills is involved), as well as in describing and defining the category of *interactional expertise* as an essential component in fields such as STS. However, I have argued, based on criticism raised by Brian Wynne, that Collins and Evans' analysis rests on a simplified understanding of the contexts to which such expertise are applied. In the case of

science-related disputes, for example, the authors focus on the ways in which experts can be distinguished from non-experts and actors with irrelevant expertise, but they do not discuss the process by which experts are assigned problems to solve. The formulation of issues is not examined, and as their theory therefore fails to incorporate any checks on the process by which science-related issues are established in the public sphere. While this limitation is inherent in the authors' stated scope (which consists of identifying experts), it does raise problems for STS analysts and others who rely on SEE to make distinctions between who are, and who are not, legitimate participants in the technical phase of science-related disputes. I have therefore argued that a supplementary approach to the normative theory of expertises is needed – one which is able to examine the science-related *questions* addressed by participants in debates, instead of exclusively focusing on the skill sets of participants.

Framing, as described by Erving Goffman, is the process by which experiences are interpreted and organised. I have focused on the potential of framing-oriented research to investigate the process of issue formulation. My main arguments for such an approach is its ability to complement the SEE approach with regards to Collins and Evans' blackboxing of issue formulation, while at the same time forming a nontechnical basis for addressing the ways in which publics assess truth claims and make sense of science-oriented debates. Collins and Evans' approach to the latter challenge is strictly oriented towards the validity of expertise, and as such it offers only a deficit model[10] by which to understand public engagement with science.

As I have shown, there is significant potential for infusing issues with political, social and other influences by those who are in the position to decide what the essential questions are in a publically contested issue. Public conceptions of what constitutes relevant questions

[10] This characterisation is made in reference to the periodic table of expertises only, as the express purpose of this table is to assess the level of (scientific) expertise of actors involved in debates.

are in turn heavily influenced by framing, which is an essential component in communication that exerts especially strong influence over public opinion on science-related issues where technical knowledge and understanding of the scientific process is low. The crucial role of issue framing in the act of convincing audiences has been demonstrated by several case studies of social movements involved in science-oriented disputes, a point illustrated by the research of Robert D. Benford and David A. Snow on nuclear disarmament movements, which showed that contestations (both internally and between activist organisations) over how issues should be framed had significant influence over the level of success attained by individual groups and, by extension, over the level of public attention to their agendas. I have also demonstrated that the attitudes of publics to morally contested science, such as research on genetic modification of food, is deeply affected by framing processes. Indeed, one expert on framing processes mentioned in Chapter 3 formed a think tank with the express purpose of assisting the U.S. progressive political community in the task of favourably formulating policies and thereby gaining public support by the use of framing-oriented research. Framing-oriented research, then, clearly has the potential to address the process by which issues are formulated as relevant science-related questions in the public sphere, thus complementing the SEE approach and establishing a more sound basis for assessing the levels of expertise amongst participants in the technical sphere of debates.

Aside from the problem of issue formulation, I have discussed two problems with SEE that might be addressed by framing-oriented research. Firstly, the positive arguments for public participation in science-oriented decision making have been left outside the scope of Collins and Evans' analysis, an omission criticised by Sheila Jasanoff for ignoring the potential of public participation in science-related decision making to improve the collective civic capacity for understanding and engaging with scientific questions – what she calls the 'civic epistemology' of society. Secondly, in contrast with the serious potential for their

prescriptive theory of expertise to infringe on democratic principles for public involvement in decision making, the authors rely on a vague and unexplained definition of 'Westernness' as a cultural justification for their theory, stating that citizens who rely on 'newspaper astrology' and similar sources for truth statements are committing social mistakes by not knowing where the credible sources for information are found in our society. While this is certainly true to the extent that astrology and similar truth systems are not used as a basis for technical decision making in developed countries, I questioned whether Collins and Evans' might be unnecessarily restrictive by downright ignoring the religious and emotional elements which affect the basis on which publics relate to truth statements. Further, their use of the term 'Westernness' implies that SEE is of only restricted cultural or geographical validity. I questioned the necessity of this self-imposed limitation.

Two case studies by Nancy L. Judd et al. were presented in Chapter 4 to demonstrate the potential benefits of including publics in the framing of science-related issues. The community-based initiatives Bioaccumulative Toxics in Native American Shellfish (BTNAS) and Marine Resources for Future Generations (MRFFG) from the U.S. State of Washington showed the involvement of stakeholders in the framing of research questions according to their concerns, affecting the technical phase of research in both cases. While Judd et al. focused on the benefits of public inclusion in framing processes for *stakeholders*, I argued that their case studies can be applied to the discussing of challenges to SEE because they demonstrate the benefits of community involvement in framing processes for the *technical* phase of research.

The BTNAS project saw the establishment of water quality and contamination assessments based on seafood safety concerns in a case where local stakeholders considered sovereignty and control of data collection and interpretation to be matters of crucial importance. The MRFFG project saw the involvement of Asian and Pacific Islander

communities in the phase of formulating research questions relevant to local concerns about the sources and contamination of seafood, as well as the inclusion of youth in this group in the task of collecting data from local vendors. In both cases the participation of local groups facilitated local awareness of risk issues. More important for the context of this paper, however, is the way that communities affected the technical phase of research by framing initial research questions according to their concerns. The successful community participation in these two cases rested on high levels of active initiative from stakeholders as well as on the existence of organised civic groups that were able to represent local populations, and the absence of either factor is a potential hindrance for any successful implementation of framing-oriented participation. Furthermore, Judd et al. called attention to the general lack of awareness of the benefits of local involvement in research framing, calling attention to the challenge of justifying the involvement of publics to funding agencies.

While recognising these challenges, I argue that community involvement in the framing of research questions is a framing-oriented approach which addresses the three challenges of SEE, thereby complementing the approach of Collins and Evans on the three critical challenges described in Chapter 2.

5.2. Observations and Proposals for Further Research

I have attempted to contribute to Collins and Evans' ambition of turning the field of STS towards the challenges of identifying relevant types of expertise in science-related debates by suggesting ways in which challenges for their proposed normative theory might be addressed. While an extensive debate on SEE already exists in the STS literature, I have shown that two important criticisms, those of Wynne and Jasanoff, both revolve around the common theme of the formulation of issues according to the concerns and level of scientific understanding amongst publics. I have on this basis suggested framing-oriented research as a useful and

necessary complementary approach to the theory of Collins and Evans. My subsequent discussion has intended to raise questions for the future development of their theory, rather than to prescribe specific methods, and several challenges therefore remain if one is to create a comprehensive approach which complements the normative theory of expertise.

In terms of STS research and the analysis of issue formulation in science-related disputes, relevant research has been cited in this paper. The work of Benford and Snow on the framing of science-related issues by social movements is useful for understanding the ways in which public, non-expert groups strategically define science-related questions. The two scholars also describe the factors which influence the success and failure of framing strategies. Substantial amounts of research on the effects of framing on public opinion also exists, some of which is cited here. STS researchers increasingly investigate the effects of framing on public knowledge about science-related issues, and this focus is also applied to some extent in the field of science communication. However, the focus of many of the authors cited in this paper is on how framing effects public *understanding* of science, rather than on how it affects their general ideas about scientific truth and their attitudes to the institution of science as such. Further investigation into questions of the relationship between science framing and the forming of civic epistemologies is likely to benefit the project discussed here, which is concerned with the basis for public stance-taking.

Research on the framing of science need not have an analytical perspective, however. As was highlighted by the case studies discussed in Chapter 4, there are significant benefits connected with the involvement publics in the formulation of research questions. As such the establishment of *practical* approaches to the inclusion of communities in framing processes is an important challenge for analysts and policy makers alike. I have already mentioned the lack of awareness of funding agencies about the benefits of community involvement in framing processes as a challenge for the attainment of necessary resources for such inclusion.

Another important challenge, particularly in developing countries and societies with few civic organisations, is the task of mobilising communities in order to be able to take their concerns into consideration in the formulation of research questions.

5.3. Conclusion

There are important reasons for demarcating experts from non-experts. World-leading climate change scientists should have authority over anonymous Wikipedia editors who, as Keen warns, 'for all anyone know, could have been a penguin in the pay of ExxonMobil' (2008, p. 43). Furthermore, the field of STS is well equipped to assess the basis of truth claims that are raised from outside the commonly accepted sphere of science (such as the protests of Cumbrian sheep farmers against official views about radioactive contamination that are presented by their government on the basis of scientific investigation), and for this reason STS researchers are in a better position than most to establish a normative theory of expertise which take unorthodox and previously unrecognised forms of lay knowledge into account. However, the limits of such a theory should be well understood before it is adopted as an analytical tool, and even more so before it is put into use by policy makers. SEE is still in development, and the constructive criticisms raised in this paper are intended to help cultivate it into a fruitful approach to our understanding of the nature of expertise.

Understanding of how issues are framed in the public sphere is a first step towards determining who constitutes the relevant experts in a given science-related dispute. Those who manage to define relevant research goals are in the position to invest hidden meanings or unintended biases into the questions that experts are assigned to answer. A one-sided focus on finding the 'right' experts for addressing a given question therefore risks legitimising precisely the kinds of unwanted influence over science that the field of STS so often sets out to expose, making attention to the framing of science-related issues a necessary task.

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